

Some Biometrics in *Pieris* and *Colias* (Lepidoptera: Pieridae) in Quebec and Nova Scotia

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Abstract: The radii of fore wings and the weights of whole air-dried specimens of adult instars of wild and reared specimens of *Pieris rapae*, *Colias philodice*, and *C. eurytheme* have been compared. Correlations (r) of high orders of significance between these two variables have been determined and shown graphically. The radii and weights of the females of the two species of *Colias*, both wild and reared, exceeded those of the males by less than 10%.

In 1953 (Lepid. News, 7: 47-8) the author published a short note pointing out the existence of correlations between fore wing radii and total dry weights of specimens of *Pieris rapae* L. reared from eggs in 1951 at Baie d'Urfé in the Province of Quebec, Canada. The mean values for radii and weights of 28 butterflies that developed from eggs collected at random on leaves of *Brassica oleracea*, and of 34 from eggs laid by one female, caught wild, were almost identical. The ranges and means of the values quoted are shown by the graph in Fig. 1. The radii of the fore wings of the 'random' set ranged from 36 to 52 mm., with the mean at 46 mm.; those of 'single brood' from 44 to 50 mm., also with the mean at 46 mm. The weights of the same specimens ranged from 8.4 to 27.5 mg., and from 15.0 to 26.3 mg., the mean values being 19.8 and 20.5 mg. respectively. The ranges of variation are thus shown to be more extensive in the random group than in the specimens from the one female. The correlations between radii and weights were found to be highly significant (1953).

In 1960 49 males and 50 females of *Colias philodice* Gdt. were caught between 27 August and 23 September at Brighton (Digby County), Nova Scotia. The radii of the fore wings of fresh specimens were measured to the nearest 0.5 mm., and, when air-dry, the specimens were weighed to the nearest 0.1 mg. The standard deviations of the means in the two sexes were very small; in the males that of the radii was about 0.7 per cent, and of the weights 2.0 per cent; in the females, radii about 0.7 per cent, and weights 1.9 per cent. The correlations of these two characters, in each sex, are shown in the scatter diagram in Fig. 2.

In order to simplify the presentation of the results of these analyses in the diagram, each + (for male) and ● (for female) represents the average of five (in one set, four) measurements and weights of specimens taken in the field in sequence of dates. The summated averages agreed almost exactly with the summations of the separate values.

The correlation values (r) being positive and of a high order of significance

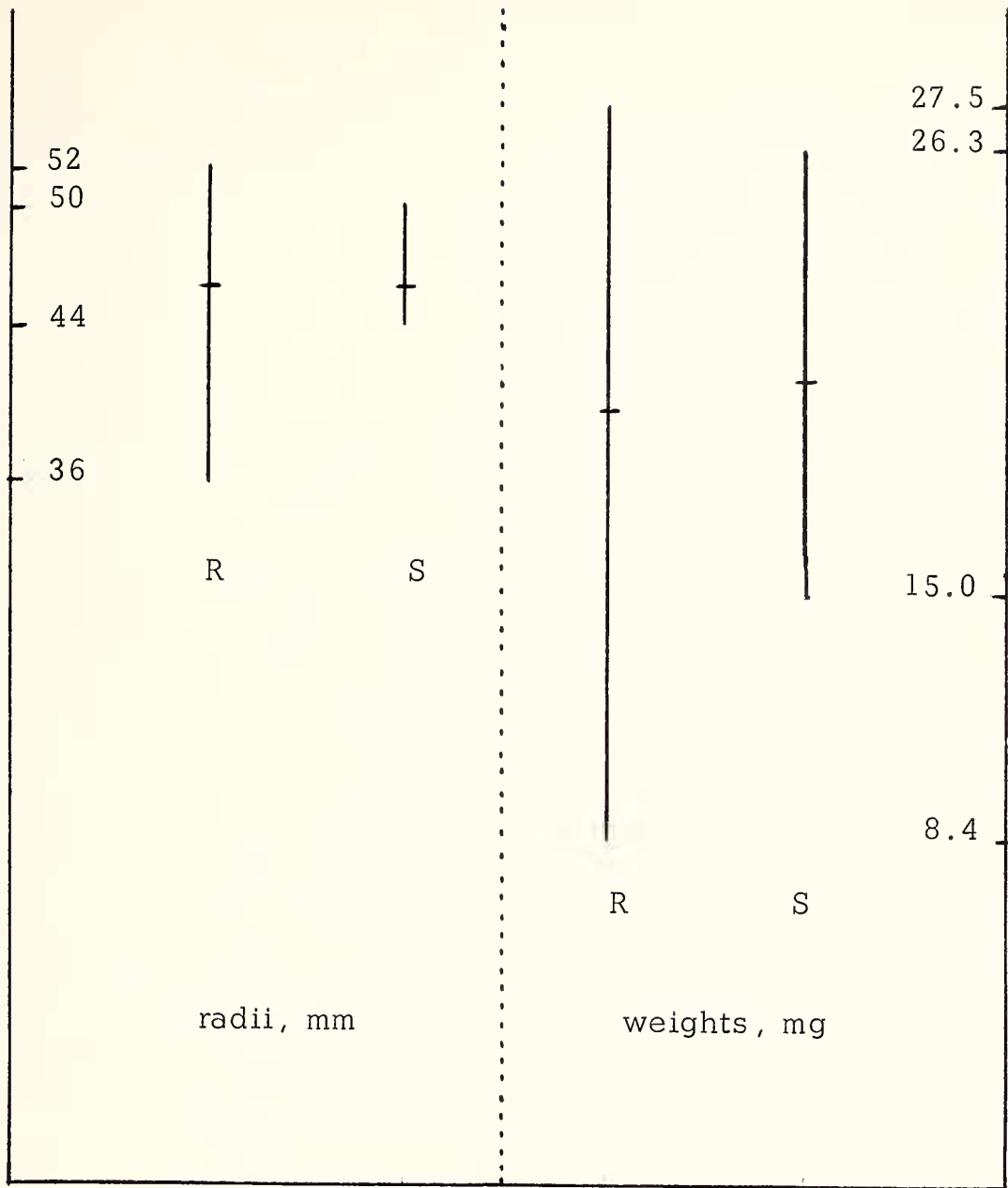


FIG. 1. Ranges of radii of fore wings and of weights of *P. rapae*, 1951. R, from random eggs; S, from eggs laid by one random female. Means are shown by short cross-bars.

suggest that lengths (and possibly areas) of the wings vary directly with the total weights of the insects. These characters have also been compared in specimens reared from larvae derived from eggs laid by white form females, one of *philodice* and one of *C. eurythyme* Bdv.

In 1960 a brood of larvae was reared from eggs laid by a white form female of *philodice* caught in September. The butterfly was kept under glass in a large earthenware flower pot, lighted and warmed by a 50 watt electric lamp. Flower heads of *Gaillardia* dipped in a weak solution of sucrose provided food. About 100 eggs were laid on the flower petals and on leaflets of *Vicia cracca* (common vetch); all the plant stems were resting in water in a narrow-necked bottle. The young larvae were transferred to fresh twigs of vetch as necessary,

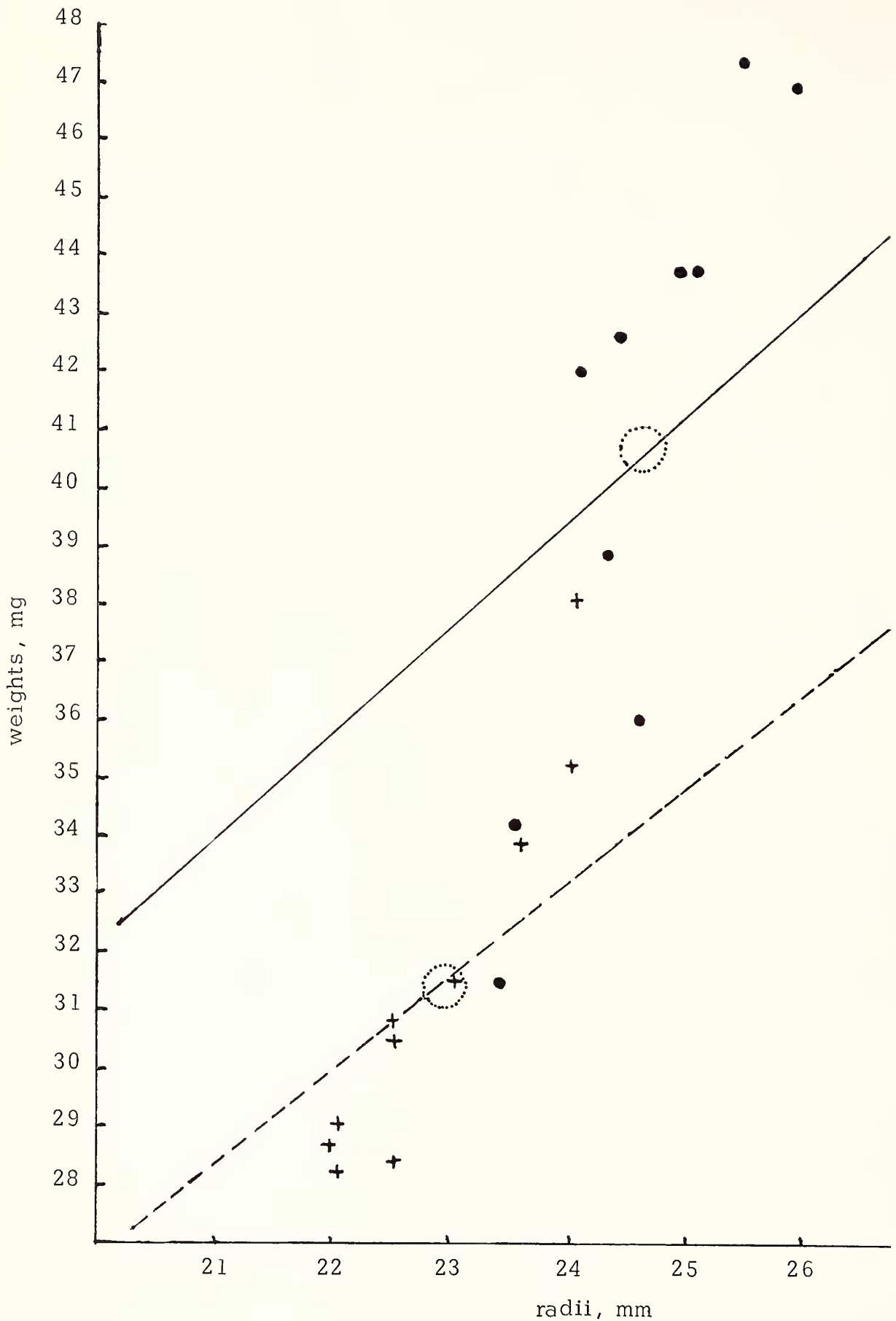


FIG. 2. Correlations between radii of fore wings and weights of *C. philodice* caught wild. + and broken line, males ($r = +0.9645$); ● and solid line, females ($r = +0.9869$). (The means of radii and weights are indicated by the dotted circles around the coordinate positions on the regression lines in Figs. 2, 3, and 4.)

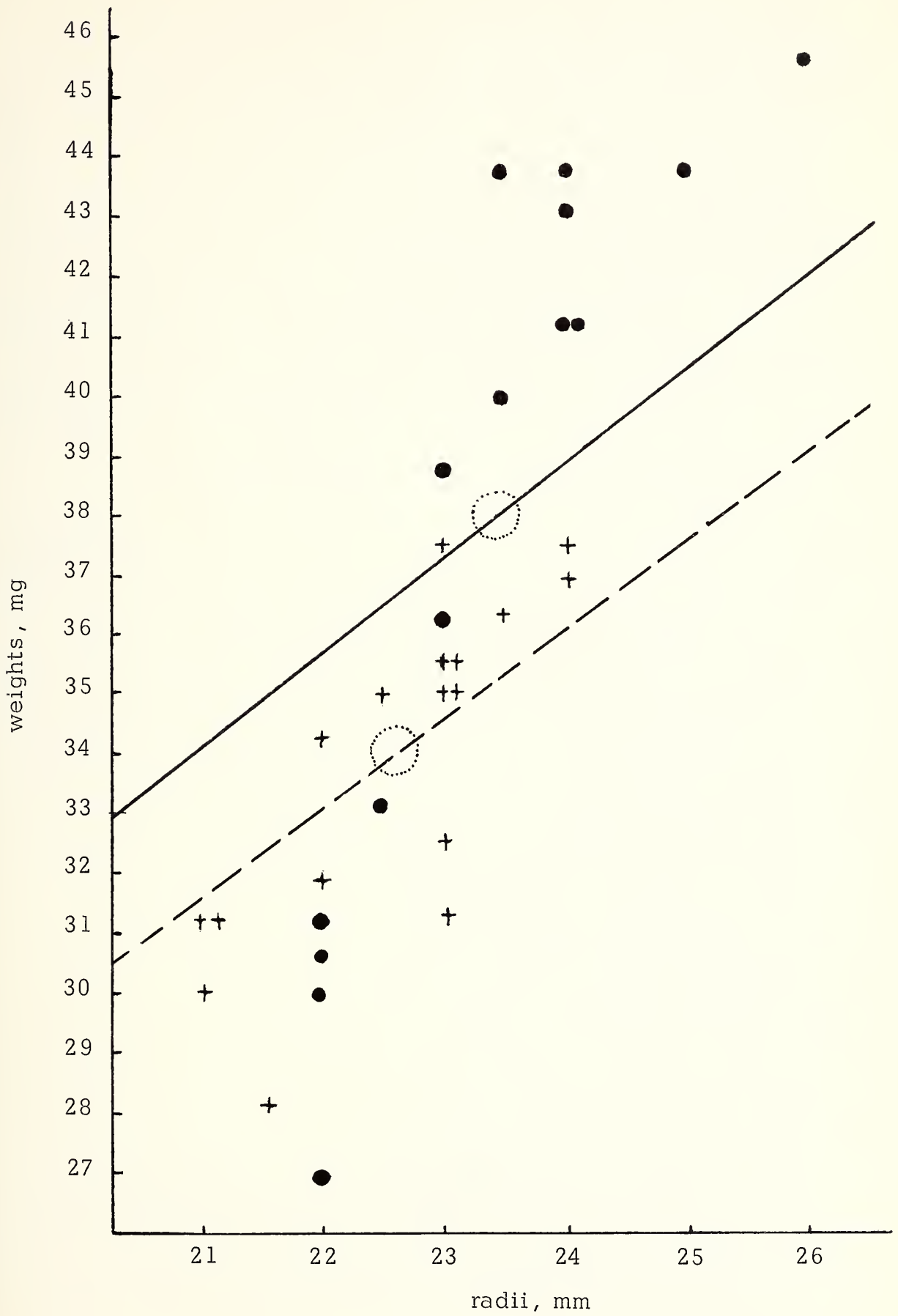


FIG. 3. Correlations between radii of fore wings and weights of *C. philodice* reared from eggs laid by a white form female. Males, $r = + 0.9721$; females, $r = + 0.9898$.

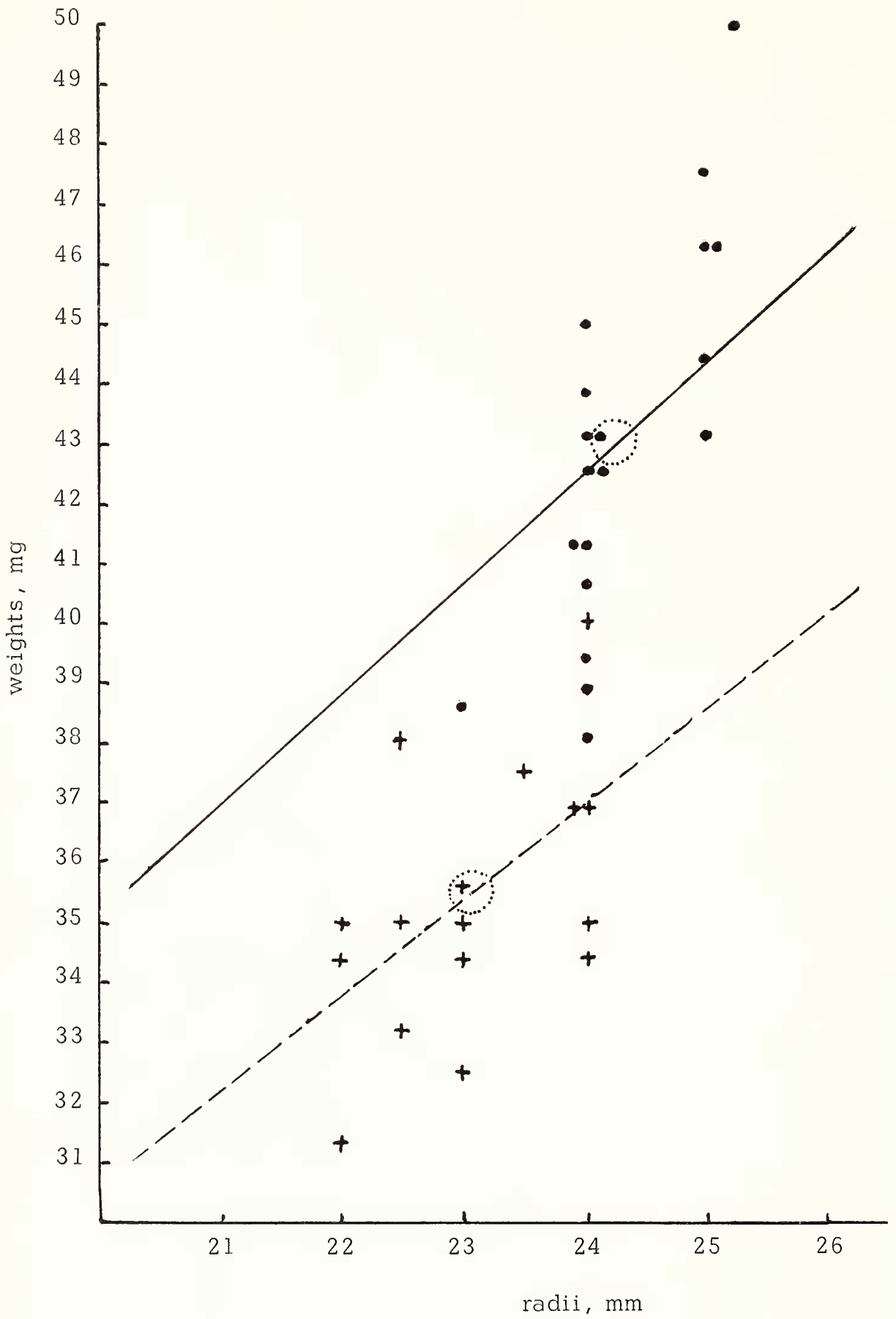


FIG. 4. Correlations between radii of fore wings and weights of *C. eurytheme* reared from a white form female. Males, $r = + 0.9845$; females, $r = + 0.9845$.

after each new leaflet had been examined for 'alien' eggs. 32 larvae reached the imago stage; 17 were males and 15 females (8 yellow and 7 white).

Standard deviations of the means of both radii and weights in both sexes were low; for the radii about 1.0 to 1.25 per cent, for weights 2.7 and 4.1 per cent, of males and females respectively. The correlations between radii and weights were high, as shown in Fig. 3.

In 1961 a white form female of *C. eurytheme*, caught wild, yielded 16 males and 19 orange form females from larvae grown indoors on vetch. The standard deviations of the characters under study, radii and weights, were less than 1.0 per cent for radii and below 2.5 per cent for weights. The correlations of these characters were highly significant in both sexes (see Fig. 4).

In the three groups of *Colias* studied the females exceeded the males in mean length of radii and in mean weights, but only by less than ten per cent; more so in length of radius than in weight, as shown in the table below.

Excess values of females over those of males, in percentages

	Radii	Weights
<i>C. philodice</i> , wild	9.3	7.7
<i>C. philodice</i> , reared	9.8	8.9
<i>C. eurytheme</i> , reared	9.4	8.2

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